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Conference Abstract

Application of safe-by-design approach for curing osteoporosis – a lock at the future

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Abstract

During the last years several studies have been performed to develop new materials for stimulation of bone healing and regeneration. Whilst it is known that osteoporotic bone is generally not cancellous in nature and has thin walls, the essential design paradigm of implants does not reflect this application.

We have proposed a simple system for assisted bone repair by in bone injection of “intelligent” polymers combined with nanodiamonds and progenitor cells. A Safe-by-Design approach was undertaken. It utilizes autologous stem cells transplantation in combination with supportive bioresorbable matrices and bioactive molecules for enhancing growth and repair. The endothelial progenitor cells obtained from peripheral blood of the same patient may be cultured *in vitro* in the presence of different stimuli and/or nanoparticles to undergo osteoblasts differentiation, prior to autologous transplantation. This injectable therapy could also be used for: (1) modifying the bone interior morphology, porosity and interconnectivity, which are extremely important for cell adhesion, proliferation and differentiation; (2) prophylactic treatment for high risk patients to prevent fractures, especially the hip and vertebrae; (3) providing exceptional repair of the osteoporotic bone by releasing pharmaceuticals to the specific sites with the purpose of accelerating healing, promoting angiogenesis, reducing the risk of infection, etc.

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Keywords

Osteoporosis, Safe-by-Design, "Intelligent" Polymers, Endothelial Progenitor Cells

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Conflicts of interest

No